IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of: Larry D. Seiler et al.	Examiner: Motilewa Good Johnson
Application No.: 10/777,842	Group Art Unit: 2628
Filed: February 12, 2004	Docket No.: 00100.02.0039
For: **APPEARANCE DETERMINATION USING FRAGMENT REDUCTION**	

REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41

Dear Sir:

Appellant submits this reply brief in response to the Examiner's Answer mailed March 17, 2008.

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I. REAL PARTY IN INTEREST

Appellant respectfully incorporates Section I from Appellant's Amended Appeal Brief filed December 17, 2007.

II. RELATED APPEALS AND INTERFERENCES

Appellant respectfully incorporates Section II from Appellant's Amended Appeal Brief filed December 17, 2007.

III. STATUS OF CLAIMS

Appellant respectfully incorporates Section III from Appellant's Amended Appeal Brief filed December 17, 2007.

IV. STATUS OF AMENDMENTS

Appellant respectfully incorporates Section IV from Appellant's Amended Appeal Brief filed December 17, 2007. The claims listed in Appendix A reflect the presently appealed claims as they stood at the time the Final Office Action was mailed on December 29, 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellant respectfully incorporates Section V from Appellant's Amended Appeal Brief filed December 17, 2007.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellant respectfully incorporates Section VI from Appellant's Amended Appeal Brief filed December 17, 2007.

V. RESPONSE TO EXAMINER'S ANSWER

Appellant respectfully reasserts its positions in its Amended Appeal Brief filed December 17, 2007 and, in addition, responds to the Examiner's Answer with the following brief comments.

Claims 1-3, 4-5 and 7

The Examiner's Answer states that "Jouppi further discloses that each pixel could store a special index value that pointed to the default fragment, col. 6, lines 1-10." (Examiner's Answer at 9 and 11). The Examiner further submits that the "graphics accelerator, 108 does not need to store the fragment value for the new fragment because the new fragment is, in effect invisible." (*Id.* at 10, citing Jouppi, col. 11, ll. 25-33). "It is therefore the position of the Examiner that Jouppi discloses dropping the fragment data having the least effect on pixel appearance and assigning a no color designation default value when no fragments cover a particular sub pixel sample or are transparent. (*Id.* at 10). However, the Examiner's Answer overlooks claim language because: (1) the association of the default fragment and the default fragment color in Jouppi is done prior to any determination of a fragment's visibility and not as part of "dropping the fragment data having the least effect on pixel appearance, wherein dropping the fragment data further includes assigning the fragment data to be dropped with a no color designation"; and (2) the default fragment is presumably associated with a background color and therefore cannot be a no color designation.

The basis for this portion of the Examiner's Answer is found in column 5, line 67 – column 6, line 10 of Jouppi where it is taught that:

> Before the fragments 310, 302 appear in the pixel 300, the pixel memory 314 can be initialized to contain a default fragment value. The default fragment value represents a background fragment that can be used when no fragments cover a particular subpixel sample

> or when all fragments that cover the particular subpixel sample are transparent. Alternatively, this default fragment value can be stored in the graphics memory 122 where the value can be shared by multiple pixels 134. Each pixel 134 could store a special index value that pointed to the default fragment.

In other words, this portion of Jouppi appears to describe an initialization operation – not a dropping operation. Jouppi teaches that, prior to determining whether a portion of a fragment is visible at any subpixel samples covered by a new fragment (*See* Jouppi, Fig. 7, step 704; col. 15, ll. 14-20), Jouppi may assign a background fragment presumably having a background color value to memory locations associated with a given pixel. In one embodiment, the assignment appears to be created by initializing the memory to contain this default background color value or by using an index value like a pointer and pointing to the default fragment.

Appellant re-emphasizes that, in Jouppi, each fragment is analyzed to determine if it is visible at any of the subpixel samples (e.g., S1-S4 covered by the new fragment). (Jouppi, col. 15, ll. 14-20). "If the new fragment is behind opaque foreground fragments, then the new fragment is invisible" (Jouppi, col. 15, ll. 37-40). Similarly, if "the new fragment has an Alpha value of 0.0 [] the new fragment is, in effect, invisible." (Jouppi, col. 5, ll. 24-33). Processing of new fragments that are invisible is complete upon such a determination. (Jouppi, col. 15, ll. 40). Thus, Appellants note that Jouppi cannot teach or suggest the claimed "dropping the fragment data having the least effect on pixel appearance, wherein dropping the fragment data further includes assigning the fragment data to be dropped with a no color designation" because upon determining that a fragment is invisible, processing is complete. To ignore this teaching mischaracterizing Jouppi.

Processing appears to be complete because the association of a default background fragment (presumably with a default background color), is performed "initially", i.e., before testing visibility of fragments. Jouppi teaches that the pixel memory 314 can be "initialized" to

contain the default background fragment value. Alternatively, the default background color can be shared by multiple pixels that point to it. (Jouppi, col. 6, ll. 6-10). Nothing in Jouppi appears to suggest that the association of the default background color with a pixel is made after determining that a particular fragment is invisible (e.g., transparent). In fact, as noted above, processing is complete.

Also, the default fragment is presumably associated with a background color and thus is not a no color designation. Jouppi expressly states that the "default value represents a background fragment that can be used when no fragments cover a particular subpixel sample or when all fragments that cover the particular subpixel sample are transparent." (Jouppi, col. 6, ll. 2-6; Emphasis added). In order to use the default value, it appears that the value must be associated with a color (e.g., a background value) to compute a color for the pixel. This is in accordance with Appellant's application and FIGs. 5-6. There, a described process "begins at step 100 where the PADC 46 receives the fragment data for a pixel to be rendered. Initially, the pixel 60 to be rendered is given an appearance value "b" representing, for example, the background color of the image. This is illustrated in FIG. 6A. Such a background value is placed in location 0 within the memory 50, represented by (0,b) at T0." (Appellant's Specification at ¶ 27; Emphasis added). As subsequently taught, the background color may be "black" and is taken into account when determining the pixel appearance value (e.g., color). (*Id.* at ¶¶ 27-31). In the above example and with reference to Appellant's Figure 6E, the pixel appearance value (e.g., color), after dropping green fragment 68 may be: (1/7)*Blue (bl) + (3/7)*Red (r) + (2/7)*Yellow (y) + (1/7)*Black (b); where the Black (b) is the background color. Similarly, Jouppi teaches that to "compute a color for the pixel 300, the color value 304 of each stored fragment triple 310, 312 is multiplied by the percentage of the subpixel samples linked by

an index to that fragment triple. Then these weighted color values are added together to produce the pixel color." (Jouppi, Col. 13, ll. 17-22).

Because the default fragment value associated with the default fragment appears to be associated with a background color value, Jouppi fails to teach dropping the fragment data by assigning the fragment data to be dropped with a no color designation. One advantage to Appellant's claimed feature is that the no color designation causes a decrease in the valid subsamples from eight to seven. (Appellant's Specification at ¶ 31). Without the dropping of fragment data having the least effect on pixel appearance and without assigning the fragment data to be dropped with a no color designation, the resulting pixel appearance value for the pixel discussed above would have been (1/8)*Blue (bl) + (3/7)*Red (r) + (2/8)*Yellow (y) + (1/8)*Black (b) + (1/8)*Green (g), and thus would have required additional processing and memory. (*Id.* at ¶ 18).

Claim 8

As to claim 8, the Examiner's Answer states that "it is the position of the Examiner that Everitt discloses determining whether the fragment data includes mask data, wherein the masked data is not dropped, [] paragraph 0026, if the stencil values associated with a pixel is not zero[,] step 330 leaves the color values for this pixel unchanged and the non-zero values mask pixels inside one or more shadow volumes." (Examiner's Answer at p. 13). Absent from the Examiner's characterization of Everitt is the remainder of Paragraph 26 where Everitt teaches that "[e]ssentially, the non-zero stencil buffer values 'mask' pixels inside one or more shadow volumes from being illuminated by the light source, creating a realistic shadow." (Everiit at ¶ 26). In other words, the masked pixels appear to result in leaving the color values for the pixel unchanged because they are not used. Everitt supports this interpretation where he states that

"[s]tencil test unit 425 masks all or a portion of the fragment from rendering according to a stencil value stored in the stencil buffer 455." (Everitt at ¶ 42). In other words, if data is masked, it is not used for rendering or for determining a pixel appearance value (e.g., a color).

Graham v. John Deer Co. Factors

Appellant noted that for each of the claims on appeal, the Supreme Court standard of obviousness set forth in *Graham v. John Deere Co.* requires the Office to, among other things: (1) resolve the level of ordinary skill in the pertinent art; and (2) evaluate evidence of secondary considerations. MPEP § 2141. Appellants submitted in its Amended Appeal Brief that neither the Final Office Action nor the Advisory Action met this threshold as no level of ordinary skill in the pertinent art was resolved and no evidence of secondary considerations had been considered by the Office. (Amended Appeal Brief at ¶¶ 18 and 21).

In response, the Examiner's Answer states that:

> The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. (Examiner's Answer at ¶¶ 13-14).

Appellant's note that this response does not even touch on the observed deficiencies noted by Appellant. Whether a secondary reference may be bodily incorporated into the structure of the primary reference and whether a claimed invention must be expressly suggested in any one or all of the references are separate inquiries under a 35 U.S.C. § 103(a) rejection. The Examiner's Answer simply ignores that part of the test of obviousness, as delineated by the United States Supreme Court, that requires the resolution of the level of ordinary skill in the pertinent art and the evaluation of secondary considerations by the Examiner prior to determining what the combined teachings of the references would have suggested to such a skilled artisan having the

resolved level of ordinary skill in the pertinent art.

VIII. CONCLUSION

For the reasons advanced above, Appellant submits that the Examiner erred in rejecting pending claims 1-3, 4-5 and 7 and claim 8, and respectfully requests reversal of the decision of the Examiner.

Respectfully submitted,

Date: May 19, 2008

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CLAIMS APPENDIX

CLAIMS ON APPEAL

1. (previously presented) An apparatus comprising:

a rasterizer operative to generate fragment data for a pixel to be rendered in response to primitive information; and

a pixel appearance determination circuit, coupled to the rasterizer, operative to determine a pixel appearance value based on the fragment data by dropping the fragment data having the least effect on pixel appearance, wherein dropping the fragment data further includes assigning the fragment data to be dropped with a no color designation.

2. (previously presented) The apparatus of claim 1, further including a memory, coupled to the pixel appearance determination circuit, operative to store the fragment data, the stored fragment data being used to generate the pixel appearance value.

3. (previously presented) The apparatus of claim 2, wherein the memory includes N locations per pixel for storing the fragment data, and when an N+1 fragment data is provided for a pixel, the pixel appearance determination circuit drops one of the N+1 fragment data.

4. (previously presented) The apparatus of claim 1, further including a display controller, coupled to the render back end circuit, operative to provide the pixel appearance value to a display.

5. (previously presented) The apparatus of claim 1, further including a setup unit operative to generate the primitive information in response to vertex information.

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6. (canceled)

7. (previously presented) The apparatus of claim 3, wherein N has a value greater or equal to 3.

8. (previously presented) The apparatus of claim 1, wherein the pixel appearance determination circuit is further operative to determine whether the fragment data includes masked sample data, wherein the masked sample data is not dropped, and wherein the masked sample data is used to determine the pixel appearance value.

9. (withdrawn) A method for determining the appearance of a pixel, comprising:

receiving fragment data for a pixel to be rendered;

storing the fragment data; and

determining an appearance value for the pixel based on the stored fragment data, wherein at least one of the stored fragment data is dropped when the number of fragment data per pixel exceeds a threshold value, wherein dropping at least one of the stored fragment data further includes providing the dropped fragment data with a no color designation.

10. (canceled)

11. (withdrawn) The method of claim 9, wherein the threshold value is in the range of between 3 and 8.

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12. (withdrawn) The method of claim 9, wherein before storing the fragment data, determining whether the number of stored fragment data exceeds the threshold value, and when the stored fragment data exceeds the threshold value dropping the fragment data having the least effect on pixel appearance.

13. (withdrawn) The method of claim 9, wherein before storing the fragment data, determining whether the fragment data includes masked sample data, wherein the masked sample data is not dropped, and wherein the masked sample data is used to determine the appearance value for the pixel.

14. (not entered) The apparatus of claim 1, wherein assigning the fragment data to be dropped with a no color designation comprises reducing a number of valid sub-sample locations in the pixel.

APPENDIX A

EVIDENCE APPENDIX

[NONE]

RELATED PROCEEDINGS

[NONE]